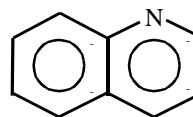


## QUINOLINE

Quinoline is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 91-22-5

Molecular Formula: C<sub>9</sub>H<sub>7</sub>N



Quinoline is a hygroscopic liquid with a penetrating odor. It absorbs as much as 22 percent water and is volatile with steam. Quinoline is slightly soluble in cold water, more easily in hot water; and miscible with alcohol, ether, and carbon disulfide. It dissolves sulfur, phosphorus, and arsenic trioxide (Merck, 1989).

### Physical Properties of Quinoline

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Synonyms: chinoleine; Leucoline; 1-benzazine; benzo[b]pyridine; 1-azanaphthalene; quinolin

Molecular Weight:	129.15
Boiling Point:	238 °C
Melting Point:	-15 °C
Vapor Density:	4.45 (air = 1)
Density/Specific Gravity:	1.0899 at 25/4 °C (water = 1)
Vapor Pressure:	1 mm Hg at 59.7 °C
Log Octanol/Water Partition Coefficient:	2.03
Conversion Factor:	1 ppm = 5.3 mg/m <sup>3</sup>

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(HSDB, 1991; Merck, 1989; U.S. EPA, 1994a)

## SOURCES AND EMISSIONS

### A. Sources

Quinoline has been detected in tobacco smoke, emissions from petroleum refining, coal and shale oil processing, and wood preservation. Quinoline has also been detected in coke oven tars (HSDB, 1991).

### B. Emissions

No emissions of quinoline from stationary sources in California were reported, based on data obtained from the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

### C. Natural Occurrence

Quinoline occurs naturally in small amounts in coal tar and in slightly decomposed sphagnum peats. It also may be extracted from bone oil (HSDB, 1991).

### **AMBIENT CONCENTRATIONS**

No Air Resources Board data exist for ambient measurements of quinoline. However, the United States Environmental Protection Agency (U.S. EPA) has compiled data from two United States urban locations during 1982. These data reported a mean ambient concentration of 0.34 micrograms per cubic meter or 0.06 parts per billion (U.S. EPA, 1993a).

### **INDOOR SOURCES AND CONCENTRATIONS**

Cigarette smoke is a source of quinoline indoors. Investigators measured quinoline levels inside 280 homes in northern California. Indoor and outdoor samples were collected at each home for 24 hours. The homes were selected by the occupants' use of indoor combustion sources such as tobacco smoking, fireplaces, woodstoves, and gas heat. The average quinoline level inside smokers' homes was 35 nanograms per cubic meter ( $\text{ng}/\text{m}^3$ ); the average quinoline level inside homes with both fireplaces and smokers was  $55 \text{ ng}/\text{m}^3$ . Average quinoline levels in the homes in all the other source categories were below limits of quantification (the median method quantifiable limit was  $24 \text{ ng}/\text{m}^3$ ). Likewise, average outdoor quinoline levels were also below quantifiable limits (ARB, 1993c).

### **ATMOSPHERIC PERSISTENCE**

Quinoline will exist in the atmosphere in the gas phase. The dominant atmospheric loss process for quinoline is by reaction with the hydroxyl (OH) radical, although reaction with gaseous nitric acid may be important in polluted urban areas or indoor environments. The estimated half-life and lifetime of quinoline in the atmosphere due to reaction with the OH radical are 0.9 days and 1.2 days, respectively (Atkinson et al., 1995).

### **AB 2588 RISK ASSESSMENT INFORMATION**

Quinoline emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

## HEALTH EFFECTS

Probable routes of human exposure to quinoline are inhalation, ingestion, and dermal contact.

**Non-Cancer:** Quinoline is an irritant of the eye and respiratory tract. Acute inhalation overexposure to quinoline vapors in humans may cause signs and symptoms such as headaches, dizziness and nausea, and coma. Quinoline overexposure has also been reported to cause injury to the cornea, retina, and optic nerve (HSDB, 1991).

According to the U.S. EPA, information on chronic effects of humans exposed to quinoline is not available. It causes liver damage in test animals exposed to quinoline by ingestion. The U.S. EPA Reference Concentration (RfC) for quinoline is under review, and no oral Reference Dose has been established (U.S. EPA, 1994a).

No information is available on reproductive or developmental effects in humans or animals (U.S. EPA, 1994a).

**Cancer:** No human studies are available on the carcinogenicity of quinoline. There is evidence of increased incidence of liver vascular tumors in rats and mice orally exposed to quinoline. The U.S. EPA has classified quinoline in Group C: Possible human carcinogen (U.S. EPA, 1994a). The International Agency for Research on Cancer has not classified quinoline as to its carcinogenicity (IARC, 1987a).

